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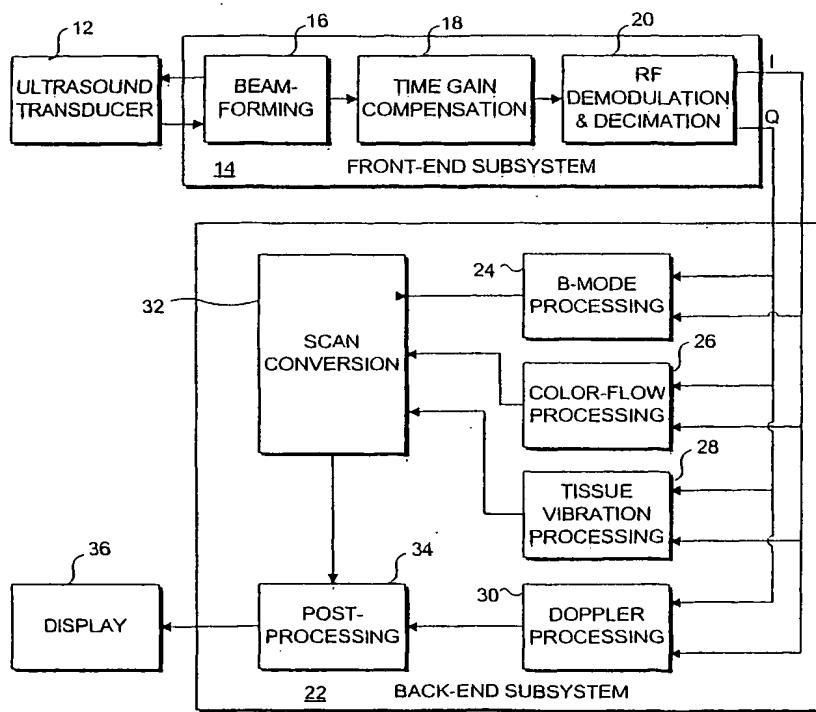
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(54) Title: TRANSCUTANEOUS LOCALIZATION OF ARTERIAL BLEEDING BY TWO-DIMENSIONAL ULTRASONIC IMAGING OF TISSUE VIBRATIONS



(57) Abstract: An ultrasound based technique for detecting and imaging vibrations in tissue caused by eddies produced during bleeding through punctured arteries or from organs. A clutter signal, normally suppressed in conventional color flow imaging, is employed to detect and characterize local tissue vibrations, to detect internal bleeding in an image, or as an audible or palpable signal, or a readout. Using a tissue vibration image, the origin and extent of vibrations relative to the underlying anatomy and blood flow can be visualized in real time, enabling measurements of vibration amplitude, frequency, and spatial distribution. Bleeding rate can be determined from the frequency and amplitude of the vibrations. Signal processing algorithms usable to identify tissue vibrations from an ensemble of 2D ultrasound data include those based on phase decomposition, spectral estimation using eigendecomposition, and spectral estimation using autoregressive modeling for isolating vibrations from clutter, blood flow, and noise.



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